UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/998,478	11/30/2001	Scott E. Black	38190/240126	6394

826 7590 02/17/2004

ALSTON & BIRD LLP
BANK OF AMERICA PLAZA
101 SOUTH TRYON STREET, SUITE 4000
CHARLOTTE, NC 28280-4000

EXAMINER	
PIAZZA CORCORAN, GLADYS JOSEFINA	
ART UNIT	PAPER NUMBER
1733	

DATE MAILED: 02/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/998,478	BLACK ET AL.
	Examiner	Art Unit
	Gladys JP Corcoran	1733

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) *21-35* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 21-35 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Groups II and III, there being no allowable generic or linking claim. Election was made **without** traverse in the Paper filed October 21, 2003.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tam (US Patent No. 5,447,586) or alternatively Zaffiro (US Patent No. 5,177,340) either

one further in view of Sickler (US Patent No. 6,466,829) and/or Ledlow (US Patent No. 6,476,716).

Tam discloses a method of heating a fiber tape for forming a composite article (column 1, lines 45-68) by providing a feed forward response surface that defines a plurality of data points correlating a predefined velocity of the fiber tape (Vs), a predefined feedforward control value, and a resulting temperature of the tape (Ts) (column 4, lines 27-63), measuring a temperature of the tape (T2), determining a velocity of the tape (V2), determining a feedback control value based on the temperature of the fiber tape and a target temperature of the fiber tape (column 4, lines 32-39), and determining a feedforward control value based on the target temperature of the tape and the velocity of the fiber tape and according to the feedforward response surface (column 4, lines 40-63), determining a heat control value based on the feedback control value and the feedforward control value (column 5, lines 1-10) and heating the fiber tape based on the heat control value (column 5, lines 10-15).

Alternatively, Zaffiro discloses a method of heating a fiber tape for forming a composite article by providing a feed forward response surface that defines a plurality of data points correlating a predefined velocity of the fiber tape, a predefined feedforward control value, and a resulting temperature of the tape, measuring a temperature of the tape (column 6, lines 5-11), determining a velocity of the tape (column 6, line 12), determining a feedback control value based on the temperature of the fiber tape and a target temperature of the fiber tape (column 8), and determining a feedforward control value based on the target temperature of the tape and the velocity of the fiber tape and

according to the feedforward response (column 7), determining a heat control value based on the feedback control value and the feedforward control value (column 9) and heating the fiber tape based on the heat control value (column 12).

Applicant has newly amended the claims to recite that the feedforward response surface comprises providing a feed forward data table of data points, each data point correlating a predefined velocity of the fiber tape, a predefined feedforward control value, and a resulting temperature of the tape. It is considered well known in the control art to provide a data table to look up predefined values in order to provide a fast determination of the end control value. For example, Sickler discloses data tables (lookup tables) are commonly used to relate variables to each other. It is further noted that Sickler discloses that such tables can be empirically determined, or calibrated. Ledlow discloses another example in the art that shows it is known to provide data tables (lookup tables) for providing values in order to provide quick and precise control in particular when controlling laser diodes. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the method of heating a fiber tape as shown by Tam or Zaffiro by providing data tables as is considered well known in the art as exemplified by Sickler and Ledlow in order to provide quick and precise control.

As to claim 2, as discussed above, it is known to use the look up tables to determine the feedforward control value by retrieving the value from the data table based upon the target and present variable values. As to claim 3, as discussed above, the data tables are generally formed through either empirical (experimental) or

theoretical (mathematical equations) methods. As to the experimental methods, one of ordinary skill in the art would appreciate forming the data table by running through the method steps as in normal operation and storing those values. For example, Tam discloses operating a fiber placement machine at the predefined velocity of the fiber tape, providing the predefined feedforward control value as a heat control value, measuring the resulting temperature of the fiber tape. Also, Zaffiro discloses operating a fiber placement machine at the predefined velocity of the fiber tape, providing the predefined feedforward control value as a heat control value, measuring the resulting temperature of the fiber tap. As to claims 4, 5 and 6, as discussed above, such data tables are well known and commonly formed by either experimentation or by theoretical methods such as mathematical calculations. It would have bee well within the purview of one of ordinary skill in the art to provide the data table through calculations, particularly since both Tam (column 5, lines 1-10) and Zaffiro both show that it is known to calculate the feedforward control value. In particular, as to claim 6 both Tam and Zaffiro both disclose determining the feedforward value comprises mathematically defining the feedforward control value according to the feed forward response surface and based on the target temperature and the velocity of the fiber tape. As to claim 7, both Tam and Zaffiro disclose using equations to calculate the feedforward response. It is well known in the art to define the feedforward control values as equations such as the one claimed, including second order equations. Such is well known in the art and would have been well within the purview of one of ordinary skill in the art to determine the appropriate equation for the particular application, only the expected results would

be maintained. As to claim 8, Tam and Zaffiro both disclose setting the target temperature of the tape (Tam: Ts). As to claim 9, Tam and Zaffiro both disclose measuring the velocity of the fiber tape (Tam: V2; tachometer 31). As to claim 10, Tam and Zaffiro both disclose setting a target velocity (Tam: Vs) of the fiber tape and determining the velocity of the tape based on the target velocity of the fiber tape (Tam: Vs). As to claim 11, Tam and Zaffiro both disclose determining feedback control value utilizing proportional-integral-differential control (Tam: column 5, lines 1-10). As to claim 12, Tam and Zaffiro both disclose determining the heat control value by summing the feedback control value and the feedforward control value.

5. Claims 13-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tam (US Patent No. 5,447,586) or alternatively Zaffiro (US Patent No. 5,177,340) either one in view of Sickler (US Patent No. 6,466,829) and/or Ledlow (US Patent No. 6,476,716) as set forth above and further in view of Krause et al. (US Patent No. 5,886,313) and/or Beyer et al. (US Patent No. 5,705,788).

Both the references Tam and Zaffiro disclose heating the fiber tape and compacting the heated tape against a workpiece such that the fiber tape conforms to the contour of the workpiece and is adhered thereto. Sickler and Ledlow both exemplify that it is well known in the art to utilize data tables for feedforward control.

It is well known in the art to heat the tape materials by irradiating the fiber tape with a laser diode array. For example, Krause and/or Beyer both show heating a tape material with a laser diode array. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the method of controlling the heating of a

fiber tape by the methods a shown by Tam or alternatively Zaffiro (in view of Sickler and/or Ledlow) by heating the tape with a laser diode array as is well known in the art and further exemplified by Krause and/or Beyer, only the expected results would be attained. As to claims 14-20 see the discussion of claim 2-7, 11 above.

Response to Arguments

6. Applicant's arguments filed November 24, 2003 have been fully considered but they are not persuasive.

Applicant argues on page 13 that Tam does not describe determining a feedforward control based on the target temperature and the velocity of the fiber tape, that neither of the components are determined according to the velocity of the tape, and that Tam does not describe determining a heat control value based on the feedforward control value. The velocity measurement and the target temperature of the tape are both used in the feedforward calculations of Tam. Finally, the feedforward value is then used to control the torch controller (heat control).

Applicant argues on page 13-14 that neither Tam nor Zaffiro disclose providing a feedforward data table of data points, that neither discloses retrieving the data from the data table, nor constructing the data table. As discussed above, it is well known in the control art to provide a feedforward data table of data points, retrieve the data from the data table, and construct the data table from empirical or theoretical methods as exemplified by Sickler and/or Ledlow.

Applicant argues that neither Tam nor Zaffiro disclose the equation or a nonlinear relationship between feedforward control and temperature. As discussed above, both

Tam and Zaffiro disclose using equations to calculate the feedforward response. It is well known in the art to define the feedforward control values as equations such as the one claimed, including second order equations. Such is well known in the art and would have been well within the purview of one of ordinary skill in the art to determine the appropriate equation for the particular application, only the expected results would be maintained. Applicant has not asserted that any unexpected results would be attained from such an equation, or that such relationships are not obvious to those in the control arts.

Applicant argues that there is no motivation for combining Krause or Beyer, that it is unclear whether the method in Zaffiro would be compatible with using a laser diode array, and non of the references disclose a calculation of feedforward control value for a laser diode array. As discussed above, it is well known in the art to heat the tape materials by irradiating the fiber tape with a laser diode array as exemplified by Krause and/or Beyer. It would have been well within the purview of one of ordinary skill in the art to provide a laser diode array as equivalent alternative heating means in the methods of Tam or Zaffiro. It would have been well within the purview of one of ordinary skill in the art to apply proper control of the heating in Tam or Zaffiro when utilizing laser diode arrays as the heating means. It is noted that Ledlow discloses that it is known in the art to control laser diode arrays. Therefore, one of ordinary skill in the art at the time of the invention would control the methods in accordance with the particular apparatus used, only the expected results would be attained.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gladys JP Corcoran whose telephone number is (571) 272-1214. The examiner can normally be reached on M-F 8am-5:30pm (alternate Fridays off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Gladys JP Corcoran
Examiner
Art Unit 1733

GJPC